Web Educational Services for All: The APEINTA project

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ABSTRACT
This paper presents the web-based educational services included in the APEINTA project. The main aim of APEINTA is to avoid barriers among the students and the education. Taking into account the advantage of cloud computing paradigm, the next web-based services are proposed: First, a captioning service, so students with hearing disabilities, for instance, could access to the verbatim speech of the teachers, even in a remote location; Second, a text-to-speech service, so students with speaking problems could participate in the class or in oral discussions or meetings, for instance, just writing in their personal devices; Third, a web-based educational system, so every student can access the pedagogical resources with time and location independency.

Categories and Subject Descriptors
K.3 [**Computers and Education**]; K.4.2 [**Computers and Society**]: Social Issues

General Terms
Human Factors

Keywords
Inclusive Education, Accessibility, Captioning Service, Web-based Educational Service,

1. INTRODUCTION
The APEINTA project is an educational project which main aim is to provide inclusive education for all, independently of the students' abilities and personal or learning preferences.

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It started in 2008 thanks to the efforts of the Spanish Centre of Captioning and Audiodescription (CESyA)[1], the Computer Science Department and the Electronic Technology Department of the Universidad Carlos III de Madrid[2].

Initially, APEINTA project proposed different services distributed in *inside* and *outside* the classroom [1]. Currently, we have realized the benefits that the cloud computing paradigm [2] could include in the services of APEINTA, adding mobility and flexibility characteristics to be used by teachers and students. Therefore, the initial services of APEINTA are now been migrated to cloud computing services, allowing the educational community to access its services from anywhere on demand regardless of their location or the device they are using.

2. Web-based APEINTA architecture
The APEINTA project proposes three different web-based services for all in the educational environment, at it is shown in Figure 1.

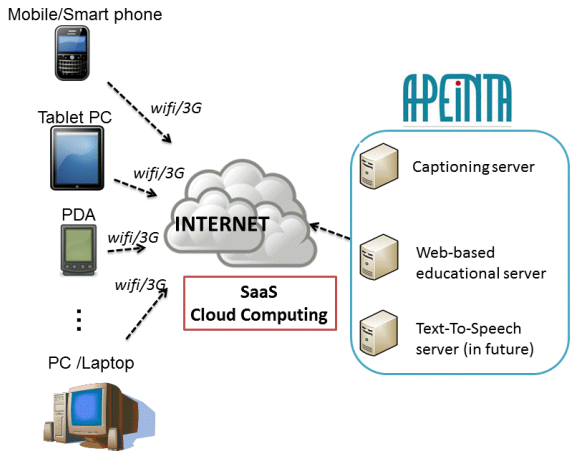

Figure 1. Web-based architecture of APEINTA

Teachers and students can access the different web-services of APEINTA by using Internet communication protocols (3G or WIFI) from their personal devices anywhere and in any moment.

[1] http://www.cesya.es

[2] http://www.uc3m.es

Originally, a Web-based Educational System was implemented in APEINTA, taking into account the functional diversity of the students and designing an accessible and user-centered system. The captioning service and the text-to-speech services, originally onsite services in APEINTA to be used into the classroom, are now been implemented as web-based services. Currently, the web-based captioning service is working and in a proximal future the web-based Text-To-Speech (TTS) service is going to be implemented too in order to make easier the access to education for all.

Next sections detail the web services of APEINTA.

2.1 Captioning Service

The captioning service of APEINTA tries to eliminate communication barriers between the teacher and students with hearing disabilities or foreign students.

The service is able to transcribe the teacher's speech with the help of an Automated Speech Recognition (ASR) system, so students can access the captions in their personal devices (tablet PC, PDA, laptop, etc.).

This service is able to provide live captioning and recorded captioning. A case example of application of the live captioning service is when the teacher and a deaf student, for instance, want to communicate and they are not placed in the same location. The teacher can use a microphone (or a mobile phone if s/he is not physically connect to a computer) to connect to the captioning server via Internet. Then, some students can hear the explication of the teacher and students with hearing disabilities can immediately obtain the verbatim speech of the teacher in his/her personal device.

In a case example for recorded captioning, a hearing impaired student wants to access to the content of a video or audio which is not subtitled. The student could use the captioning service to obtain the verbatim captions of the video or audio just uploading the file to the server.

It is important to underline that thanks to the implementation of the web services, it can be used inside and outside the classroom, adding new uses and benefits to the onsite one included in the first architecture of APEINTA (where the paradigm of cloud computing was not took into account).

2.2 Web-based Educational System

APEINTA also propose the use of inclusive web-based educational systems with digital accessible contents in order to avoid physical barriers for the students. More details about this web-based service can be found in [3].

2.3 Text-to-Speech (TTS) Service

The TTS service of APEINTA allows students with speech problems to type questions or comments in a personal device that lately would be spoken by a synthetic voice. This service allows these students to fully participate in the classroom.

The web-based service is not yet implemented, but we present in this paper the benefits that it could include in the educational environment. For instance, it would allow students to participate remotely in classes in an inclusive way.

3. USE OF APEINTA'S SERVICES

The services of APEINTA have been successfully used in different environments. For instance, in 2009 a web-based educational system was created in a *Computer Science* degree at Universidad Carlos III de Madrid (SPAIN). The captioning service of APEINTA was used in different scenarios: in two conferences (AMADIS'09 and ACCAPS'09); in two different talks in secondary schools in 2010; and in two degrees at Universidad Carlos III de Madrid during 2009: *Computer Science* and *Library and Information Science*.

This project has been well received by the community of people with sensory disabilities. As prove of it, APEINTA received in 2009 the FIAPAS[3] award for research and innovation in education from the national association of the deaf.

4. CONCLUSIONS

Three web-based services of APEINTA project are presented in this paper. These cloud computing services provide software to reduce serious accessibility barriers in educational contexts. Although its use was originally thought to be applied in that environment, we are currently working on applying its services in other scenarios as meetings, congresses, etc.

5. THE PRESENTED VIDEO

The video that will be presented at the conference will review the main innovations of the APEINTA project. It is intended for the general public, shows the problems that deaf students have to face during all their life and how APEINTA could avoid educational barriers. Two typical scenarios of use are shown: a primary school and a university. In the video we see students using the system both remotely and onsite for access the teacher speech. Deaf students participate in the video. Interviews to representatives of their education and researchers of this project are included.

6. ACKNOWLEDGMENTS

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[3] FIAPAS is the Spanish Confederation of Parents and Friends of Deaf People